

# ISRU-Based Robotic Construction Technologies for Lunar and Martian Infrastructures

Completed Technology Project (2012 - 2014)



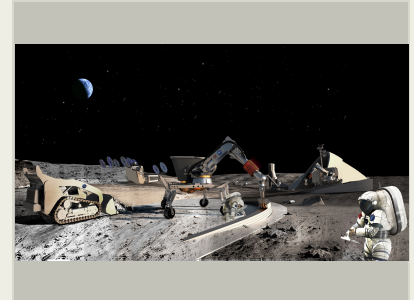
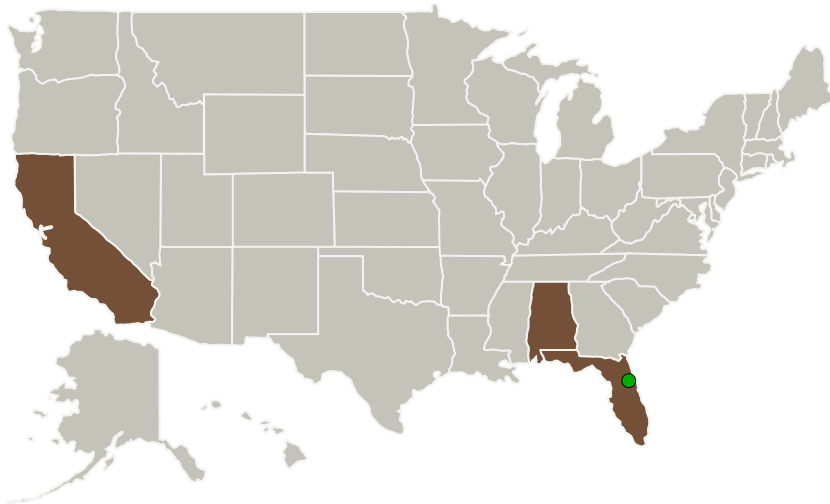
## Project Introduction

This study hopes to examine how to robotically pour regolith-based concrete on the Moon or Mars. The study team is adapting its current, Earth based technologies that can pour eight foot tall concrete walls robotically. Automated building technologies will revolutionize the way structures are built on Earth, in dense urban environments, in difficult-to-build and difficult-to-service sites, or in remote and hostile regions of the globe. The technologies under development by our group have the potential to simplify construction logistics, reduce the need for hard physical labor by assigning humans to a strictly supervisory role, eliminate issues relating to human safety and produce intricate, aesthetically refined designs and structures at significantly reduced construction cost. Space architecture in general and Lunar and Martian structures in particular will also provide a rich new aesthetic vocabulary for architects to employ in the design and creation of buildings that employ high technology and building information modeling that is vital for optimizing use of materials and energy that is critical to building economics.

## Anticipated Benefits

This could lead to swift and reliable Lunar and Martian infrastructure development.

## Primary U.S. Work Locations and Key Partners



Project Image ISRU-Based Robotic Construction Technologies for Lunar and Martian Infrastructures

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Organizations Performing Work	Role	Type	Location
University of Southern California(USC)	Lead Organization	Academia	Los Angeles, California
● Kennedy Space Center(KSC)	Supporting Organization	NASA Center	Kennedy Space Center, Florida

Primary U.S. Work Locations	
Alabama	California
Florida	

## Project Transitions

▶ **August 2012:** Project Start

✓ **August 2014:** Closed out

**Closeout Summary:** Our activities have advanced on many fronts. We have successfully engaged in team building efforts, we have conducted extensive literature review in related domains and engaged in architectural conceptual design of planetary outpost elements, we have performed materials and process studies, built experimental machines and conducted numerous laboratory experiments, conducted structural design and analysis studies, jointly taught a new Moon Studio architecture course, created several high fidelity visuals, made presentations at several conferences, published several research articles on various aspects of our project in engineering and architectural proceedings and journals, and participated in several interviews for related articles and television programs that appeared in acclaimed international media.

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

University of Southern California (USC)

**Responsible Program:**

NASA Innovative Advanced Concepts

## Project Management

**Program Director:**

Jason E Derleth

**Program Manager:**

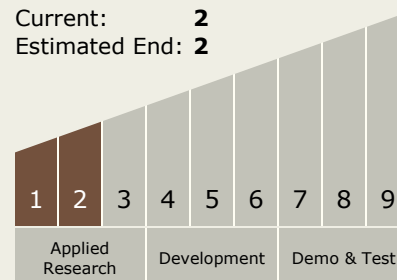
Eric A Eberly

**Principal Investigator:**

Behrokh Khoshnevis

## Technology Maturity (TRL)

Start: **1**  
 Current: **2**  
 Estimated End: **2**



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## Images



**11566-1366060440573.jpg**

Project Image ISRU-Based Robotic Construction Technologies for Lunar and Martian Infrastructures  
(<https://techport.nasa.gov/image/102128>)

## Technology Areas

### Primary:

- TX07 Exploration Destination Systems
  - └ TX07.2 Mission Infrastructure, Sustainability, and Supportability
    - └ TX07.2.3 Surface Construction and Assembly

## Target Destinations

The Moon, Mars